BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
	)	
Inquiry Regarding Carrier Current Systems Including Broadband over Power Line Systems	)	ET Docket No. 03-104

REPLY COMMENTS

Aeronautical Radio, Inc. ("ARINC"), by its attorneys, hereby submits its reply to comments filed in this proceeding.

The proponents of broadband power line carrier (BPLC) systems and the ARRL have submitted detailed plans, test data, and analyses of the risks that these systems pose to licensed HF and VHF communications facilities and other systems. The conclusions that one must reach from these submissions are that the threat of BPLC networks to radio communications is very real and that stringent limits on radiated emissions are necessary to preserve existing licensed HF service. The interference problems created by BPLCs are exacerbated by the wide areas that they cover, creating multiple sources of radiofrequency interference. ARINC's experience with interference from multiple carrier-current devices operating in the vicinity of one of its receiver sites demonstrates the inadequacy of the current regulation of these Part 15 devices. Further testing and evaluation of BPLC technology is necessary to determine what radiated emission limits should be established to protect the 12

bands allocated to aeronautical mobile (R) service (AM(R)S) between 2.85 and 22 MHz and whether conducted limits are also necessary. In these important, and heavily used, aeronautical safety communications frequencies, even the German NB 30 limits are 10 to 20 dB too high. Further analyses are also necessary to determine what protection is necessary for the 75 MHz marker beacons.

ARINC is the communications company of the air transport industry. It was created to ensure the safety of the life and property in the air through the use of radio communications with aircraft. Today, ARINC operates advanced high-frequency voice radio facilities at locations outside of New York City, at locations in the San Francisco Bay area, and on Molokai and Guam. These stations are used for air traffic service communications to the oceanic flight information regions (FIRs) assigned to the United States in the Atlantic, Pacific, and Caribbean areas and for operational control communications with aircraft throughout the world. In order to to automate some operational control communications generated by aircraft, ARINC also operates a global AM(R)S HF data link system with stations located in the United States and abroad. In the United States, HF data link stations are co-located at the HF voice sites, and an additional station has recently been implemented at Barrow, Alaska, to provide enhanced polar coverage for data and voice. To supplement these stations, ARINC has contracted with other facilities providers to implement HF stations for operational control in Cedar Rapids, Houston, and Miami. Taken together, these facilities are engaged into providing vital safety communications to aircraft in flight beyond the line-of-sight range of VHF communications.

The FCC has raised the issue as to what protection would be necessary to keep existing licensed radio services free from interference generated by BPLC system operating on frequencies in the 2-88 MHz range. Aviation is one industry that remains dependent upon HF for worldwide communications. HF is a fickle communications medium that is very sensitive to noise levels. ARINC radio operators and aircraft pilots are trained to be able to pluck from the noise information relating to safety of aircraft operations. ARINC radio operators literally work aircraft whose received radio signals are within a few decibels of the ambient noise levels, and HF data link receivers will successfully receive data with a signal to noise of as little as 3dB. The ambient noise level at the receiver is thus the determining factor as to whether an aircraft can communicate. At ARINC receiver sites, the ambient noise level (man-made plus atmosphere) is typically below –130 dBW at 3.0 MHz and below –145 dBW at 22.0 MHz into the 2.4 kHz front-end of the receivers.* The FCC should not take actions that would result in any increase in the noise floor in the HF radio spectrum, because any noise increase would inevitably diminish the ability of aviation to maintain communications with aircraft operating over-oceans and in remote areas of the world. This loss of communication would directly impair the safety of life and property in the air.

Broadband communications over power line carrier systems has potential greatly to exacerbate interference to HF communications. BPLC systems are wide-area networks with multiple wires, each acting as an individual HF radio antenna with varying efficiency, and the network is connected into a large number of residential and business wiring systems with perhaps even greater potential for unintended radiation. The present limits in Part 15 of the

* The emission designators are 2K80J3E for single side band voice and 2K80J9W for data links. The receiver band pass is set at 300 Hz to 2.7 kHz.

FCC's rules are totally inapposite for the type of continuous operation and wide-area coverage envisioned by BPLC networks.

This multiple-source interference is especially troubling to ARINC's HF operation. For example, in February 2002, ARINC began receiving intolerable interference on 3013 kHz at Half Moon Bay, California. The signals were measured at –85 dBm at ARINC's receiver site about 1.5 miles from the main concentration of homes at Half Moon Bay, and this interference easily masked many of the weaker signals being received from aircraft over the Pacific Ocean. The FCC was consulted and investigated the complain, but no action has been possible because the multiple sources of interference within Half Moon Bay make it difficult to isolate individual sources of interference. In the residential area of Half Moon Bay, the signal levels were –30 dBm, but a clear fix on any single source was not possible.

In an effort to understand the interference better, ARINC purchased and tested a Phonex Part 15 power line telephone line/modem extender (FCC Identifier HMTIND-260115-KX-N), a carrier-current device that generates signals centered at approximately 3016 and 6388 kHz. This device created the same type of interference at a distance of 5 miles that ARINC was receiving at Half Moon Bay. For the convenience of not installing a wired phone jack, communications with aircraft are lost. Eighteen months later, the interference persists, and ARINC is forced to abandon this frequency at Half Moon Bay. The FCC has been unable to protect safety communications from harmful interference in this instance. The regulation of Part 15 devices should be reviewed to determine how to prevent these problems in the future.

ARINC and the aviation community are also worried about far-field effects should BPLCs become widespread. No data have been submitted that would indicate what impact these systems might have on the aircraft receivers. While the physical separation between BPLCs operating on land and aircraft operating over oceans would protect the aircraft receivers from a single BPLC system as long as the emission levels of individual systems were kept low enough to protect the ground stations, the far-field cumulative effect of multiple systems should be also be evaluated.

In addition, within the band 2-88 MHz, aviation uses 75 MHz for aeronautical marker beacons. These beacon aid in instrument approaches and landing by marking the glide slope. As an aircraft passes over the beacon, it receives a signal. In all likelihood, this service, in its present configuration will be found to be sufficiently robust to withstand BPLC-generated interference, but low-power radionavigation applications are under development that will be more sensitive to interference. In any event, there does not appear to be much experience with BPLCs operating at 75 MHz, and further analyses of the impact of BPLCs on present and future marker beacons are necessary.

Beyond the specific frequency interference that ARINC has experienced to date, general implementation of BPLC systems will increase the noise temperature for HF communications, diminish the range and utility of HF communications, and result in communications delays or the lack of communications all together. The current proliferation of Part 15 devices threatens vital communications services, such as ARINC's HF services. Additional applications, such as the proposed BPLCs, should be permitted only after careful compatibility testing with existing systems. The comments demonstrate the difficulty of

predicting the nature of the interference that BPLCs will cause. The FCC should proceed with caution until experimental data gives sufficient assurance that standards can be adopted to protect HF safety communications.

Respectfully submitted,

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